## 4.1 INTRODUCTION

This section presents requirements for tank closures that are regulated under Chapter 319 RSMo and 10 CSR 20-10.071-074. Closure of an underground storage tank (UST) means that the tank has been removed or filled with an inert solid material and has had all tank openings (e.g., tank tubes, vent pipes, pipelines) permanently sealed or capped according to the requirements of this section. This guidance may also be used to close above ground storage tanks (ASTs) that contain petroleum products. Owners of hazardous substance tanks must submit a plan for approval prior to conducting closure.

Implementation of the guidance presented in this document will fulfill the requirements of 10 CSR 20-10-071(4). However, the entity performing tank closure may present alternative written procedures to MDNR that may be more appropriate based on site conditions. Similarly, procedures presented in this document may not address all actions that MDNR may determine are necessary. MDNR may require additional actions to achieve compliance with applicable laws and regulations.

The tank closure process generally includes the following activities:

- Submission of Storage Tank Closure Notice;
- Removal of tank(s) and piping or in-place tank closure;
- Collection and analysis of soil and groundwater samples;
- Disposal of any waste streams (tank, soil, tank contents, and water) generated; and,
- Submission of a tank closure report.

The closure of tanks is the responsibility of the owner/operator of the tank and all correspondence from MDNR shall be addressed to the owner/operator. However, upon written request of the owner, MDNR will facilitate the closure process by working with the company hired by the owner/operator to close the tank.

## 4.2 SUBMISSION OF UST CLOSURE NOTICE

The process of tank closure begins when an entity submits a "Storage Tank Closure Notice" to MDNR. This notice must be submitted at least 30 days prior to initiating closure activities, unless tank removal is necessary to abate an emergency. In this case, the tank closure notice shall be submitted at the earliest possible time after abatement of the emergency. A blank copy of the form can be found at Appendix G of this document and can be downloaded from http://www.dnr.state.mo.us/oac/forms/780-1782.pdf.

MDNR will review the tank closure notice and return a signed copy to the owner to acknowledge receipt.

## 4.3 CLOSURE OF TANKS BY EXCAVATION OR CLOSURE IN PLACE

Tanks may be closed either by excavation and removal or closed in-place, the latter by filling the tank(s) with an inert material. In either case, MDNR requires that storage tanks be cleaned, removed or filled, and disposed in accordance with recommended industry practices developed by organizations such as US EPA or American Petroleum Institute (API). For tanks closed in-place, a property deed notice must be executed to provide notice to future purchasers and lessees of the details (location, size, date of closure etc.) of the tanks closed on site.

For in-place closures, all vents, pipelines, and fill tubes must be sealed with cement or concrete grout. The tanks must be cleaned and emptied of all hydrocarbon liquids or sludges before they are filled with an inert material with properties similar to those of rock and soil. If fly ash is used to fill tanks, a beneficial use request must be submitted to MDNR's Solid Waste Management Program (SWMP) in accordance with 10 CSR 80-2.020(9)(B) for review and approval, unless a general use exemption has been approved. For the latter, the fly ash must be handled in accordance with the terms and conditions of the exemption.

## 4.4 SOIL SAMPLING DURING UST CLOSURES

This section presents the sampling and analysis requirements for the tank removal and closure process. The number and location of samples to be collected as part of a UST closure depends on the (i) volume of the UST, (ii) layout of the UST system, and (iii) the presence of physical encumbrances in the tank excavation. Physical encumbrances include (i) groundwater that rapidly fills a tank pit and prevents soil sampling, (ii) concrete pads beneath the tanks, and (iii) bedrock in the tank excavation. The number and locations of soil samples to be collected is presented in Section 4.4.2.

### 4.4.1 Collection of Soil Samples

All soil samples must be collected from undisturbed native soils, generally about a foot below the fill material. It may not be necessary to remove all backfill from the tank pit to collect the required samples. Color photographs of the sidewalls and floor of the tank excavation must be taken and submitted to document site conditions. Note: all boring or monitoring wells greater than 10 feet deep are subject to the Missouri Well Driller Law and regulations.

All soil and ground water samples sent for laboratory analysis must be analyzed for the appropriate chemicals of concern (COCs) using the laboratory methods listed in Table 5-1.

During the tank closure process, sufficient color photographs shall be collected to document the condition of tanks, excavation, pads, etc. and submitted with the closure report.

If the sampling requirements presented in this section cannot be met due to site-specific conditions, an alternative plan must be submitted to MDNR and approved.

### 4.4.2 Number and Location of Soil Samples

This section presents sampling requirements for projects where fewer than 200 cubic yards of native soil (not including the backfill material) are excavated. For sites where more than 200 cubic yards of native soil have been contaminated, refer to Section 4.4.4 for proper sampling requirements.

#### 4.4.2.1 Soil Sampling for UST Removals with No Physical Encumbrances

Samples have to be collected from beneath the tank (tank pit floor) and along the tank pit wall in the direction COCs or petroleum product is most likely to migrate. Exhibit 4-1 presents the number of samples and Figures 4-1(a) to 4-1(d) present the locations where the samples shall be collected.

**Exhibit 4-1**
**Tank Excavation Sampling for UST Removals with No Physical Encumbrances**

| Sample Location | Sample Requirement |
|---|---|
| Beneath a UST that is 110 to 1,000 gallons capacity | One grab sample required under each tank. Sample beneath the center of the UST or its former location [Figure 4-1(a)]. |
| Beneath a UST that is greater than 1,000 gallons capacity | Two grab samples required under each tank. One sample beneath each end of the tank or its former location [Figure 4-1(b)]. One sample should be from beneath the fill port. |
| Downgradient Wall | One grab sample from each 20-foot section required. Collect the sample from the hydraulic downgradient wall of the excavation pit at the point of greatest visible contamination. If no contamination is visible, collect the sample from the wall at a level 12" below the bottom of the UST or its former location [Figures 4-1(c) and 4-1(d)]. |

#### 4.4.2.2 Soil Sampling Requirements if Groundwater is Encountered During UST Removal

If the pit recharges with water so quickly that it is not possible to obtain the samples listed above (Section 4.4.2.1), soil samples must be collected from native soil adjacent to each of the four sides of the UST at the mean low water level (MLWL). As shown in Exhibit 4-2 and Figures 4-2(a) to 4-2(d), the number and location of samples depend on

the size of the tank and whether the pit has single or multiple USTs. Note the grab sample must be collected 12" below the bottom of the UST or its former location if the MLWL is not discernible.

**Exhibit 4-2**
**Required Soil Sampling for Tank Excavation Filled with Groundwater**

| Closure Removal Scenario | Sampling Requirements |
|---|---|
| Single UST ≤ 8,000 Gallons | One grab sample from each wall of the tank excavation at the mean low water level [Figure 4-2(a)]. |
| Single UST > 8,000 Gallons | One grab sample from each wall of the tank excavation along the end of the tank and two grab samples from each wall along each side of the tank at the mean low water level [Figure 4-2(b)]. |
| Multiple USTs ≤ 8,000 Gallons | One grab sample from each wall of the tank excavation along each side and end of a tank at the mean low water level [Figure 4-2(c)]. |
| Multiple USTs > 8,000 Gallons | One grab sample from each wall of the tank excavation along each end of the tank and two grab samples from each wall along each side of the tank at the mean low water level [Figure 4-2(d)]. |

#### 4.4.2.3 Soil Sampling Requirements for USTs Resting on Concrete

If the UST is resting on a concrete pad and the pad is to be left in the ground, the pad must be cleaned and examined for cracks and petroleum staining. Soil samples must be taken from all sides of the pad. The number of samples will depend on the size and number of tanks, as presented in Exhibit 4-3 and Figures 4-3(a) to 4-3(d). If the pad is cracked, a soil sample must be taken beneath the cracked area.

#### 4.4.2.4 Sampling Requirements when Bedrock is found in the excavation

If bedrock is encountered in the tank excavation and soil samples cannot be collected in accordance with Section 4.4.2.1, one grab sample must be collected from along each side of the tank at the interface of the bedrock and the native soil of the walls of the tank pit. Exhibit 4-4 and Figures 4-4(a) to 4-4(d) present the number and location of the samples.

**Exhibit 4-3**
**Required Soil Sampling for Tanks Resting on Concrete Pad**

| Closure Removal Scenario | Sampling Requirements |
|---|---|
| Single UST ≤ 8,000 Gallons | One grab sample from along each side of the pad [Figure 4-3(a)]. |
| Single UST > 8,000 Gallons | One grab sample from each end of the tank and two grab samples from each side of the tank along the concrete pad [Figure 4-3(b)]. |
| Multiple USTs ≤ 8,000 Gallons | One grab sample from each side of the pad at the ends and sides of each tank [Figure 4-3(c)]. |
| Multiple USTs > 8,000 Gallons | One grab sample from each side of the pad at the ends of each tank and two grab samples from each side of the pad along the sides of each tank [Figure 4-3(d)]. |

**Exhibit 4-4**
**Required Soil Sampling for Tanks Resting on Bedrock**

| Closure Removal Scenario | Sampling Requirements |
|---|---|
| Single UST ≤ 8,000 Gallons | One grab sample from each wall of the tank excavation at the bedrock soil interface [Figure 4-4(a)]. |
| Single UST > 8,000 Gallons | One grab sample from each wall of the tank excavation along the end of the tank and two grab samples from each wall of the tank excavation from each side of the tank at the bedrock soil interface [Figure 4-4(b)]. |
| Multiple USTs ≤ 8,000 Gallons | One grab sample from each wall of the tank excavation along each side and end of a tank at the bedrock soil interface [Figure 4-4(c)]. |
| Multiple USTs > 8,000 Gallons | One grab sample from each wall of the tank excavation along each end of the tank and two grab samples from each wall of the tank excavation along each side of a tank at the bedrock soil interface [Figure 4-4(d)]. |

The samples must be collected from native soil exhibiting the heaviest staining at a depth at or beneath the bottom of the tank. If bedrock or coarse gravel prevents collection of soil samples from native soil at a depth beneath or equivalent to the bottom of the tank (i.e. tanks blasted into bedrock) or if contamination extends into bedrock, a geologist or a qualified professional engineer registered in the State of Missouri must perform a geologic assessment to determine the potential for product migration and groundwater contamination.

At a minimum the geologic assessment should include the following information:

- The type of bedrock and formation;
- Soil type and soil morphological features;
- The competence of bedrock (i.e., weathered zone, degree of fracturing, etc.);
- A description of potential karst development at the site;
- The potential for perched groundwater within or on top of bedrock;
- The presence or absence of water in the tank pit and the water source;
- The depth to groundwater;
- The direction of groundwater flow;
- Downgradient receptors within 1/4 mile;
- The construction, depth, and static water level for all monitoring wells on site, any private wells within 1/4 mile radius of the site, and any public water supply wells within one mile of the site;
- The highest levels of soil contamination near the bedrock surface;
- A professional opinion regarding the potential for product migration and groundwater contamination;
- High resolution color photographs of bedrock surface exposed during assessment and areas which were exposed to excessive contamination; and,
- A description of the stratigraphy present in the areas of question, i.e. known regional aquifers, confining layers, etc.

#### 4.4.2.5 Soil Sampling Requirements for in-place UST Closures

Soil samples for in-place UST closures must be collected along the center of each side and end of the UST. Field screening must be used on a continuous core to the total depth. Any interval above the target depth which shows contamination must be sampled as a separate grab sample. Exhibit 4-5 and Figures 4-5(a) to 4-5(d) show the number and location of the samples that depend on the size and number of tanks.

If the tank(s) are on a concrete pad, these samples shall be collected as close to the pad as possible.

#### 4.4.2.6 Additional Soil Sampling Requirements for All UST Closures

In addition to sampling the tank excavation described above, samples must also be collected from (i) the product piping, (ii) dispensers, (iii) any remote fill ports associated

with the tank system, and (iv) soil excavated from the tank pit that is to be used to refill the tank pit or as clean fill. If a waste oil tank is being closed, site background conditions must be determined. Exhibit 4-6 shows the number and location of the additional samples.

**Exhibit 4-5**
**Required Tank Excavation Soil Sampling for In-Place Closures**

| In-place Closure Scenario | Sampling Requirements |
|---|---|
| Single UST ≤ 8,000 Gallons | One grab sample from each side and end of the tank [Figure 4-5(a)]. |
| Single UST > 8,000 Gallons | One grab sample from each end of the tank and two grab samples from each side of the tank [Figure 4-5(b)]. |
| Multiple USTs ≤ 8,000 Gallons | One grab sample from each end and side of a tank [Figure 4-5(c)]. |
| Multiple USTs > 8,000 Gallons | One grab sample from each end of a tank and two grab samples from each side of a tank [Figure 4-5(d)]. |

**Sampling of Excavated Soil:** All backfill material and native soil that is removed or disturbed during excavation is excavated soil for the purposes of this document. All excavated soil must be sampled and analyzed to (i) determine if the material can be placed back into the excavation or (ii) characterize it for disposal. Field screening may be used as a tool for separating contaminated soil from non-contaminated soil. However, field screening may not be used to document that soil can be placed back into the excavation.

If excavated soil is to be placed back into the excavation, samples of the soil must be analyzed for all applicable COCs listed in Table 5-1. A minimum of one composite sample must be collected from each 100 cubic yards. The composite sample should be composed of soil from no more than 4 separate locations collected from at least 2 feet into the pile.

If the excavated soil is to be placed back into the excavation, the soil must meet the cleanup target levels applicable to the site. Excavated soil that does not meet the cleanup target levels may not be returned to the excavation. Such soil must either be disposed off-site at an approved disposal facility or otherwise managed in accordance with state laws and regulations.

If the soil is disposed at an approved sanitary landfill, the landfill should be contacted to determine their requirements for sampling.

**Sampling Background Conditions:** If heavy metals, volatile organic compounds (VOCs), or polynuclear aromatic hydrocarbons (PAHs) are detected at a waste oil tank excavation, a sample must be collected upgradient of the excavation at a location not affected by the contamination to verify naturally occurring background conditions. If an upgradient sample is not provided, MDNR will assume any elevated levels are due to a release from the waste oil tank.

**Exhibit 4-6**
**Additional Sampling Required for All Closures**

| Sample Locations | Sampling Requirements* |
|---|---|
| All Product Lines | One grab sample per piping trench from each twenty-foot section. In doing so, sample preferentially under joints, flex connectors and pipe elbows. If piping trench is less than five feet in length, no sample is required. Piping sample is required even if the piping is to remain in use. |
| All Dispensers | One grab sample from beneath each dispenser is required, unless the dispenser is directly above the UST. Soil must be sampled even if the dispenser is to remain in use. |
| Remote Fill Ports | One grab sample at connection and an additional grab sample for each twenty-foot section of pipe. |
| Excavated Soil | One composite sample required from each 100 cubic yards. |
| Site Background Conditions – Used Oil Only | One grab sample collected upgradient of the tank excavation, if metals contamination is detected in the tank excavation |

* The samples must be collected 12" into native soil.

### 4.4.3 Groundwater Sampling Requirements for UST Closures

Impact to groundwater must also be evaluated as a part of the closure activities. The number and location of samples will depend on whether or not water is encountered in the tank excavation during the tank closure activities. The sampling requirements under these conditions are presented below. For UST closures, groundwater is defined as water from the first saturated zone or water-bearing unit capable of measurable recharge within 12 hours.

#### 4.4.3.1 Sampling Groundwater Encountered During UST Excavation and Removal

If water is encountered in the pit, it is assumed to be groundwater unless it is removed to determine whether it is groundwater or trapped surface water. If the water is not removed from the tank excavation or the pit recharges with groundwater within 12 hours, a grab sample of the water in the excavation must be collected and analyzed. If the groundwater shows COC (refer to Table 5-1) concentrations above the DTLs in Table 3-1**,** additional site characterization may be required.

#### 4.4.3.2 Groundwater Sampling if Encountered During in-Place Closure

Groundwater must be analyzed if it is encountered during an in-place closure. If the concentrations of COCs in the groundwater are above the DTLs listed in Table 3-1, a minimum of three groundwater monitoring wells or properly constructed piezometers must be installed as described below:

(i) One monitoring well or properly constructed piezometer must be installed immediately adjacent to the UST pit on the hydraulic downgradient side. The well or piezometer should be installed topographically downgradient if the hydraulic downgradient is unknown. The monitoring well must be screened across the first saturated zone. The others should be placed in such a manner as to determine groundwater flow and elevation.

(ii) Regulations require that the wells be drilled and constructed in accordance with the Geological Survey and Resources Assessment Division (GSRAD) Monitoring Well Construction Rules (10 CSR 23-4.010-4.080). Contact the GSRAD Wellhead Protection Section at (573) 368-2165 for more information.

(iii) Following well development and purging, representative groundwater samples must be collected and analyzed for COCs per Table 5-1. The boring log, chain of custody, and analytical results must be included as part of the closure documentation. All auger flight cuttings must be properly disposed.

(iv) Contact the Tanks Section if groundwater sampling is not possible.

#### 4.4.3.3 Groundwater Sampling if Not Encountered During UST Excavation and Removal

This section discusses the circumstances under which groundwater sampling is required even though groundwater was not encountered in the tank pit. For the purposes of this section, the volume of materials in the original tank excavation zone or pit and in the piping trench is not considered in determining the volume of soil excavated due to contamination. Further, soils that exist beyond that original tank pit and piping trench are considered excavated soils regardless of whether the material is a naturally developed soil or the material is a fill that was used to elevate or level the site surface.

A groundwater investigation is required for any site where the volume of excavated soils, ignoring the tank pit and piping trench, exceeds 200 cubic yards, regardless of final soil sample results. In this situation, the department assumes the excavated soils to be contaminated and believes that a volume exceeding 200 cubic yards is indicative of a significant petroleum release and a heightened threat of groundwater contamination.

A groundwater investigation is not required where the excavation is less than 200 cubic yards and the final soil sample results do not exceed the values are listed on Table 4-1, Column A.

The values in Table 4-1, Column B may be substituted for the default target levels provided that a registered geologist or qualified professional engineer has determined that the groundwater use pathway is incomplete. This determination is documented using the process described at Section 6.3. Again, provided that soil excavation, beyond the tank pit and line trench, does not exceed 200 cubic yards, no groundwater investigation is required.

If the groundwater use pathway is determined to be complete, then the values in Table 4-1, Column A shall be used.

If the values in Table 4-1 cannot be met, then a groundwater investigation is required. In all other instances, a groundwater investigation is required.

### 4.4.4 Sampling Sites after Excavation of Contamination

This section applies to sites where more than 200 cubic yards of contaminated native soil have been removed, or further excavation is necessary to remove the affected soil. These 200 cubic yards of native soil do not include backfill material that must be removed prior to closure sampling. The sampling specified in this section may be used to verify that excavation of the contaminated areas has been successfully completed.

The following sampling plan applies any time contaminated native soil is removed from the tank pit, piping run and underneath dispensers. Samples must be taken from (i) each excavation wall; (ii) the floor of the excavation; and, (iii) areas where a potential migratory pathway exists (e.g. utility conduits). If the sampling requirements presented in this section cannot be met due to site-specific conditions, an alternative plan must be submitted to MDNR and approved prior to implementation.

#### 4.4.4.1 Excavation Walls

Samples must be taken from each wall of the excavation. If the wall is less than twenty feet in length one grab sample is required. If the wall is more than twenty feet long, it must be divided into equal sections of no more than twenty feet with one grab sample collected from each section. If contamination is present, take the sample in the area of greatest staining. If contamination is not obvious, the sample must be taken from the

wall within one foot of the excavation floor in the center of the section [Figure 4-5(a)].

#### 4.4.4.2 Excavation Floor

Divide the excavation floor into thirty-foot grid sections (a square with thirty-foot sides). Take one grab sample from each grid square. The sample should be taken from the area of the grid section with the greatest staining. If there is no obvious staining, take the sample from the center of the grid section [Figure 4-6(b)].

#### 4.4.4.3 Sampling near Potential Pathways

Samples must be taken at all potential pathways, including, but not necessarily limited to, buried pipelines, sewers, water lines or other utility conduits.

#### 4.4.4.4 Groundwater Sampling

In addition to the requirements of Section 4.4.3 above, groundwater must be assessed at the site if more than 200 cubic yards of native soil (or other fill materials outside the tank/piping excavation zone) were contaminated above the DTLs. If water is not present in the pit, then the assessment must be completed in accordance with Section 4.4.3.3.

#### 4.4.4.5 Location of Wells

If more than 100 cubic yards of native soil (or fill material outside the tank/piping excavation zone) were contaminated above the DTLs, a land use map must be submitted showing any drinking water wells located within one thousand feet (1,000') of the site.

## 4.5 WASTE DISPOSAL AND TREATMENT

During UST closure activities, several types of waste might be generated (e.g. sludge and rinsate, contaminated soil, contaminated water, unusable product, etc.). These wastes require proper management to ensure that human health and the environment are protected.

For all activities that result in generation of waste, MDNR prefers to utilize pollution prevention technologies to reduce the amount of waste generated. However, pollution prevention methods cannot eliminate all wastes generated during UST closure. MDNR recommends that, whenever possible, wastes be recycled rather than disposed.

The owner/operator of the UST bears the responsibility of ensuring that wastes generated during UST closure activities are properly managed. Wastes must be properly characterized before being shipped off-site to a facility that is approved/permitted to accept the wastes. Waste transporters must possess all applicable licenses required to transport the waste. In addition, the UST owner/operator must ensure that all relevant and applicable OSHA and NIOSH safety standards are followed during UST closure activities.

### 4.5.1 On-site Storage of Excavated Soil

Excavated soil must be placed on and covered with plastic or a similar impermeable material. A permit to stockpile contaminated soil on site is required if these requirements cannot be met. On-site storage should be for the minimum period necessary to arrange for appropriate management of the soil.

### 4.5.2 Recovered Product

Product recovered from a UST may be managed by using or selling the material for its intended use, returning the material to the distribution system (e.g. pipeline or terminal), or sending the material off-site for fuel blending or disposal. Recovered product sent for disposal is assumed to be a hazardous waste and is subject to the testing requirements of 40 CFR Part 261 and 10 CSR 25-4.010 (see Exhibit 4-7). In order to demonstrate that recovered product has been properly managed, the closure report must include documentation signed by a representative of the facility to which the material was sent attesting to the use, recycle or disposal of the material. Please direct questions regarding proper waste characterization to MDNR's Hazardous Waste Program (HWP) at (573) 751-3176.

**Exhibit 4-7**
**Requirements for Proper Management of Hazardous Waste Based on the Quantity Generated or Accumulated**

| Amount of Hazardous Waste Generated per Month or Accumulated at Any One Time | Actions Required |
|---|---|
| < 100 kg (220 lbs.) | Responsible party is a "conditionally exempt small quantity generator."<br>a) characterize the waste<br>b) dispose of the waste at a permitted disposal facility |
| 100 to 1000 kg<br>(220 to 2200 lbs.) | Responsible party must comply with all standards set forth for small quantity generators:<br>a) characterize the waste<br>b) complete Notification of Regulated Waste Activity form to obtain generator identification numbers*<br>c) meet all applicable storage requirements<br>d) send the waste for disposal within the required time frames (180 days, 270 days if transported greater than 200 miles)<br>e) properly manifest the waste<br>f) dispose of waste at a permitted disposal |

| | |
|---|---|
| | facility<br>g) report the waste disposed on the Generator's Hazardous Waste Summary Report* |
| > 1000 kg (2200 lbs.) | Responsible party must comply with all standards set forth for large quantity generators:<br>a) characterize the waste<br>b) complete Notification of Regulated Waste Activity form to obtain generator identification numbers*<br>c) meet all applicable storage requirements<br>d) send the waste for disposal within the required time frames (90 days)<br>e) use the manifest system<br>f) dispose of waste at a permitted disposal facility<br>g) report the waste disposed on the Generator's Hazardous Waste Summary Report* |

- Contact the MDNR's Hazardous Waste Program at (573) 751-3176 for further information.

### 4.5.3 Disposal of Petroleum Contaminated Pit Water

Petroleum contaminated water that accumulates in the UST excavation pit but that has not come in contact with the interior of the UST is deferred from hazardous waste management for the toxicity characteristics represented by the waste codes D018 through D043 (refer to 40 CFR 261 for a list of the toxicity characteristic waste codes). However, the pit water must still be assessed for toxicity characteristics represented by the waste codes D001-D017. After the hazardous waste determination has been made, disposal options include: i) disposal at a municipal wastewater treatment facility; ii) direct discharge under a general permit; and, iii) disposal at a permitted hazardous waste disposal facility. These three options are further discussed below.

#### 4.5.3.1 Disposal at a Municipal Wastewater Treatment Facility

A municipal wastewater treatment facility, otherwise known as a Publicly Owned Treatment Works (POTW), may accept petroleum-contaminated water, but is not required to do so. Permission to discharge wastewater to the POTW must be obtained from the POTW before the water may be discharged. The closure report must include appropriate documentation demonstrating that the water was accepted by the POTW.

If an on-site connection to a sanitary sewer is present and written permission from the POTW has been obtained to place the wastewater into the sanitary sewer, the wastewater is exempt from solid and hazardous waste regulations. However, if the wastewater is determined to be hazardous prior to discharge to the sanitary sewer, it must be managed according to all applicable hazardous waste rules and regulations.

If the POTW will not accept untreated wastewater, the POTW might agree to accept the wastewater after it has been treated on-site to minimize contaminant concentrations. If the wastewater is to be treated on-site, a hazardous waste treatment permit must first be obtained from MDNR's HWP. Note, however, that a hazardous waste treatment permit is not required if the wastewater is treated on-site solely via gravity separation, simple filtration, or the use of an oil/water separator. (Note: the separated product and filter media may be a hazardous waste after the on-site treatment is completed and, if so, must be managed appropriately.)

#### 4.5.3.2 Discharge Under a General Permit

Wastewater cannot be discharged to the environment except under a General Permit for Fuel Spill Cleanup (MO-G940000) issued by MDNR's Water Protection Program (WPP). The generator does not need to obtain a permit if wastewater is discharged directly into a sanitary sewer in accordance with 40 CFR 261.4(a)(1)(ii) (as above, prior approval from the municipal wastewater treatment facility is required), or if the wastewater is hauled directly to a treatment facility. However, to document proper disposal, MDNR requires that a signed statement from the receiving facility be included in the closure report.

#### 4.5.3.3 Disposal at a Waste Disposal Facility

If the discharge limits of the general permit or the POTW cannot be met, then wastewater that is hazardous (see Exhibit 4-7) must be sent to a permitted disposal facility. The wastewater must be transported to the facility under manifest by a licensed hazardous waste transporter. A list of licensed hazardous waste transporters may be obtained from MDNR's HWP at (573) 751-3176.

Non-hazardous wastewater that does not meet the discharge limits of the general permit or the POTW may be sent to a disposal facility that is permitted to accept it. If transported, the wastewater must be managed according to all applicable Department of Transportation (DOT) regulations.

### 4.5.4 Disposal of UST Wastes

All waste from the interior of an UST is assumed to be hazardous waste and is subject to a hazardous waste determination. In addition, any media or debris that comes in contact with the interior of the UST or with waste removed from the interior of the UST is assumed to be hazardous, unless laboratory analyses indicate otherwise (see Exhibit 4-8). If UST wastes are managed under an exemption, appropriate documentation must be submitted to MDNR to verify proper disposal. For more information regarding the proper management of UST wastes, contact the MDNR's HWP at (573) 751-3176. For a copy of MDNR's technical bulletin "Management of Petroleum Storage Tank Wastes," contact the Outreach and Assistance Center (OAC) at (800) 361-4827.

### 4.5.5 UST Disposal/Recycling

Before being transported off-site, USTs must be emptied, cleaned and purged in accordance with all applicable industry practices. Once emptied, cleaned and purged, the UST may be disposed as solid waste or recycled (e.g. scrapped or salvaged). The closure report must include a signed statement from the owner of the UST(s) or the receiving facility attesting to the fate of the UST.

### 4.5.6 Recording of USTs Closed In-Place

The existence of an UST closed in place must be recorded on the property deed pursuant to 10 CSR 80-2.030(2). A "Statement of Closure" form may be used to comply with this requirement (contact MDNR's OAC at (800) 361-4827 for a copy of the "Statement of Closure" form). During any potential property transaction, it is the property owner's responsibility, under Missouri Solid Waste Management Law (260.213 RSMo), to inform a potential buyer that a solid waste is located on the property and that the potential buyer may incur liability for that waste under State and Federal laws.

**Exhibit 4-8**
**Toxicity Characteristic Information Sheet**

| **Media and Debris that are Deferred from the RCRA Toxicity Characteristics Rule for Analysis for the Hazardous Waste Codes D018 – D043*** | |
|---|---|
| **Deferred**** | **Not Deferred** |
| Materials outside of an UST:<br>• Soil (before & after treatment)<br>• Groundwater (before and after treatment)<br>• Floating Plume<br>• Surface Water<br>• Rock, Grass and Stumps<br>• Empty USTs<br>• Empty Piping | Materials from inside the UST:<br>• Sludge<br>• Water<br>• Unusable Product<br>• Waste Materials/Rinsate from UST Cleaning<br>• Spent Carbon or Waste from Treatment |

| Minimal Sampling Required to Properly Characterize Petroleum-Contaminated Waste for Disposal*** | |
|---|---|
| **Deferred**** | **Not Deferred** |
| • Ignitability<br>• Lead | • Ignitability<br>• Lead<br>• Benzene |

* Refer to 40 CFR 261 for hazardous waste codes.

** The deferral only applies to media and debris that are contaminated by petroleum from USTs subject to corrective action under 40 CFR Part 280.

*** Laboratory analytical data must be submitted to document that the waste is not a hazardous waste under the Toxicity Characteristic Rule. Additional analyses may apply dependent on the waste generated and site specific conditions.

### 4.5.7 Disposal of Petroleum Contaminated Soil

Soil contaminated with petroleum, provided that it is not a hazardous waste and does not contain free liquid, may be taken to a permitted sanitary landfill as a special waste, provided the landfill is willing to accept it. Prior to disposal, a "Special Waste Disposal Request" (contact the MDNR's OAC for a copy of the "Special Waste Disposal Request" form) must be submitted to and approved by the landfill. A copy of the form and analytical data for the soil must also be included in the closure report. The closure report must also include a copy of the shipping papers or the landfill disposal receipts to document the landfill's receipt of the material. Questions regarding proper disposal of petroleum contaminated soil should be directed to MDNR's SWMP at (573) 751-5401. Also, a copy of the MDNR's technical bulletin "Disposal of Soil Contaminated with Virgin Gasoline or Virgin Fuel Oil," can be obtained from MDNR's OAC.

### 4.5.8 Treatment of Petroleum Contaminated Soil

Prior to implementation of an alternative or on-site soil treatment option (e.g., landfarming, in-situ biological treatment, thermal treatment, etc.), a Corrective Action Plan (CAP) must be submitted to MDNR's Tanks Section for review and approval. If treatment will be via on-site landfarming, a permit must be obtained from MDNR's WPP before landfarming begins. For information concerning landfarming permits, contact MDNR's WPP at (573) 751-1300.

### 4.5.9 Reusing Excavated Soil as Fill

Excavated soil intended for placement back into the UST excavation pit must meet the cleanup target levels applicable to the site. Excavated soil that does not meet the cleanup target levels may <u>not</u> be returned to the excavation. Such soil must either be disposed off-site at an approved disposal facility or otherwise managed in accordance with state

laws and regulations. Refer to Section 4.4.2.6 for further information.

Excavated soil intended for use as fill material other than via replacement into the excavation pit must be managed in accordance with all applicable state solid and hazardous waste laws and regulations. Soil used as fill (except when replaced in the excavation pit) must meet the SWMP's clean fill criteria or be managed under a beneficial reuse request. Contact MDNR's SWMP at (573) 751-5401 prior to using excavated soil as fill material.

### 4.5.10 Applicability of the Toxicity Characteristic Rule

Under the Toxicity Characteristic (TC) Rule, media and debris from closure or cleanup of a petroleum UST that is subject to corrective action under 40 CFR Part 280 are deferred from being managed as hazardous waste for the toxicity characteristic for the hazardous waste codes D018 through D043 (refer to 40 CFR 261 for a list of the toxicity characteristic waste codes). The term "media" includes naturally occurring materials such as soil, groundwater, surface water, and air that are contaminated with substances released from USTs. The term "debris" refers to solid material that is a manufactured object, plant or animal matter, or natural geologic material.

To properly characterize deferred media and debris, the applicability of the hazardous waste characteristics designated by the hazardous waste codes D001 through D017 must be determined. In most cases, deferred petroleum contaminated media and debris should be analyzed for the characteristic of ignitability. Where the USTs contained leaded gasoline, analysis should also be performed for the toxicity characteristic of lead. If contaminated media and debris do not exhibit any of the applicable hazardous characteristics, the wastes may be managed as non-hazardous solid waste.

Wastes that come in contact with the interior of the UST are not deferred from the toxicity characteristics for the hazardous waste codes D018 through D043. These wastes (e.g. rinsate, cleaning materials, sludge, scale, water, unusable product, etc.) are hazardous when disposed, unless analytical testing indicates otherwise or they are managed according to an exemption. These wastes must be characterized to ensure disposal in accordance with hazardous waste laws and regulations. Documentation indicating that the waste is non-hazardous should include laboratory analytical data for the hazardous characteristics of ignitability, benzene and lead.

## 4.6 SUBMISSION OF THE CLOSURE REPORT

A closure report must be submitted to MDNR within 60 days of completion of closure activities, unless otherwise approved in writing by MDNR, using the "Closure Report Format" developed by MDNR and included in Appendix G.

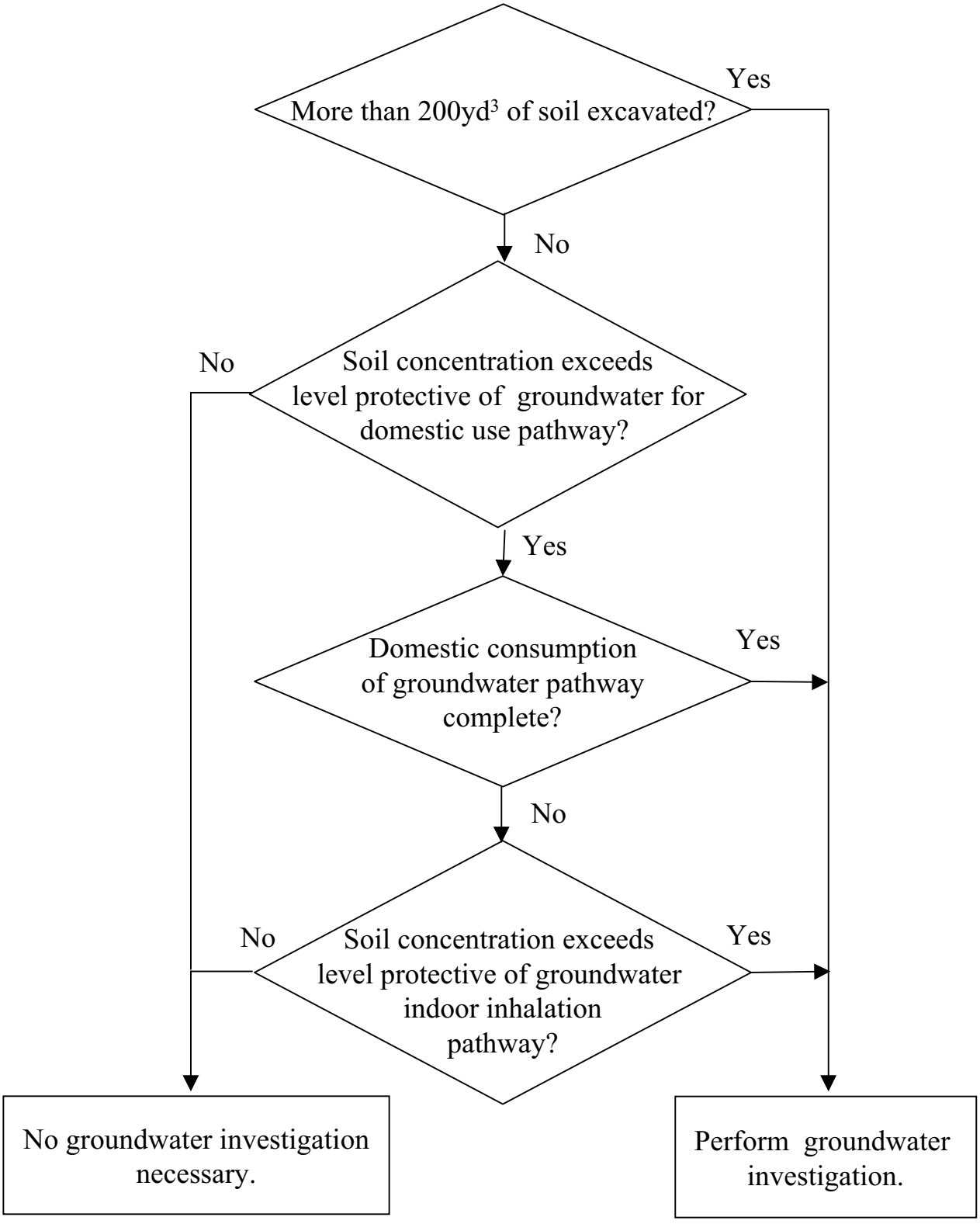


**Figure 4-1: Flowchart to Determine Need for Groundwater Investigation During Tank Closure Activities.**

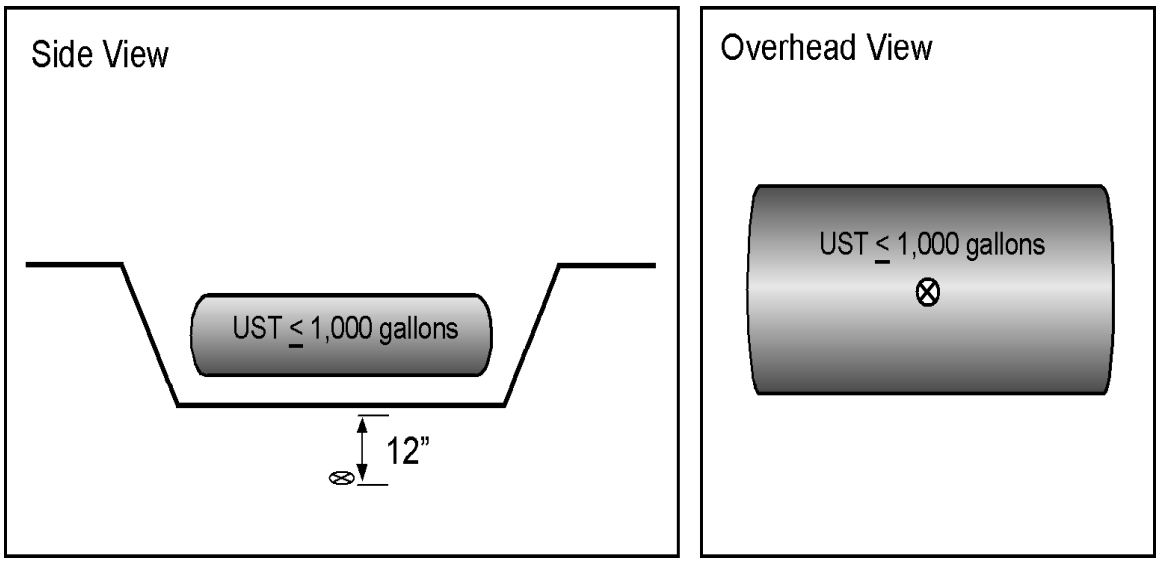


**Figure 4-1(a). Tank Floor Sampling Where No Physical Encumbrances Exist for Tanks 1,000 Gallons or Less.**

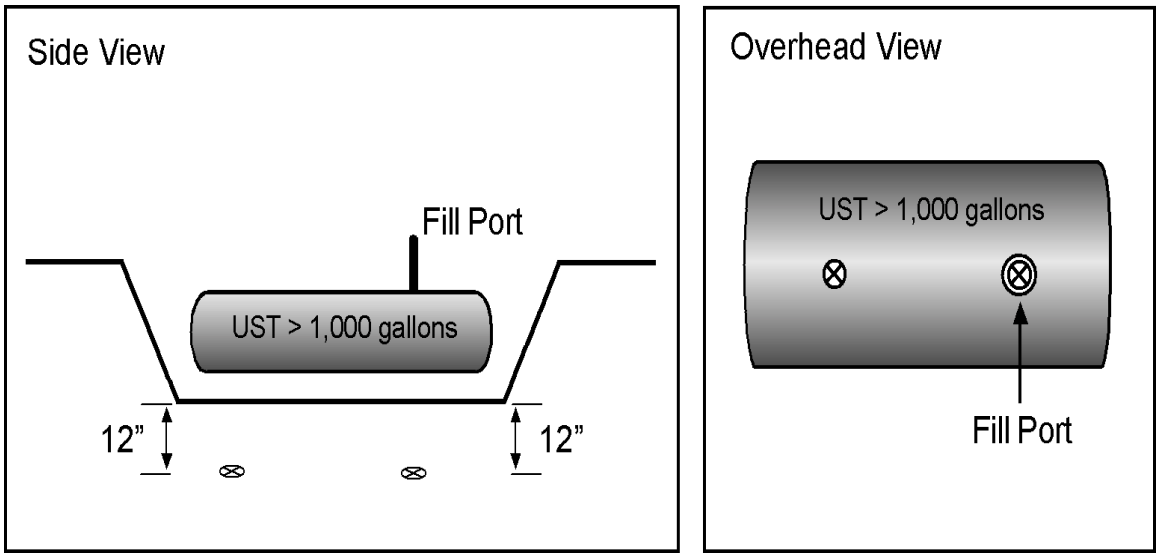


**Figure 4-1(b). Tank Floor Sampling Where No Physical Encumbrances Exist for Tanks Greater than 1,000 Gallons.**

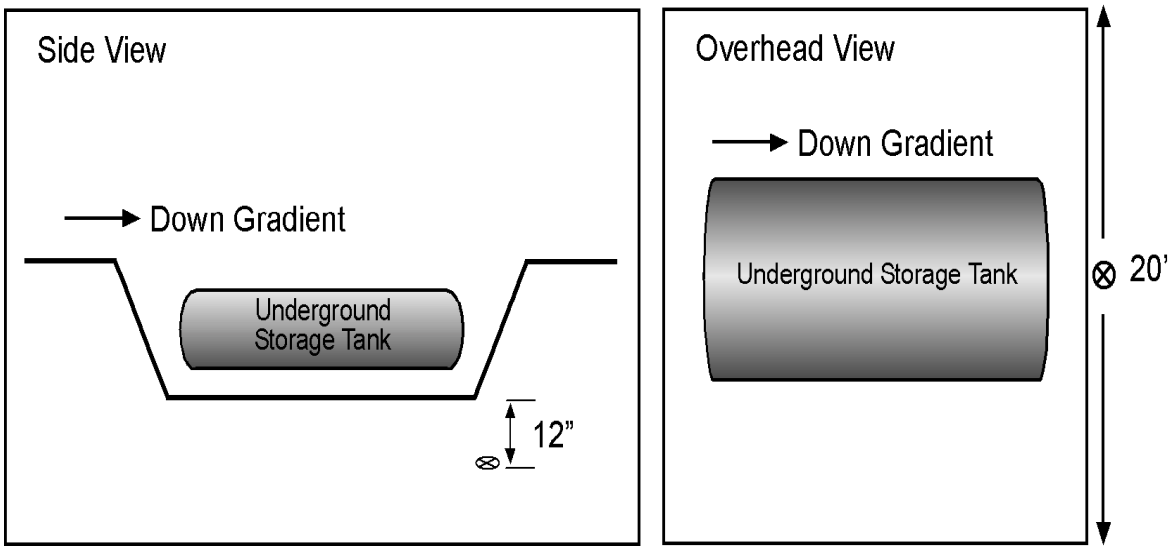


**Figure 4-1(c). Hydraulic Downgradient Wall Sampling, 20 Feet of Wall or Less.**

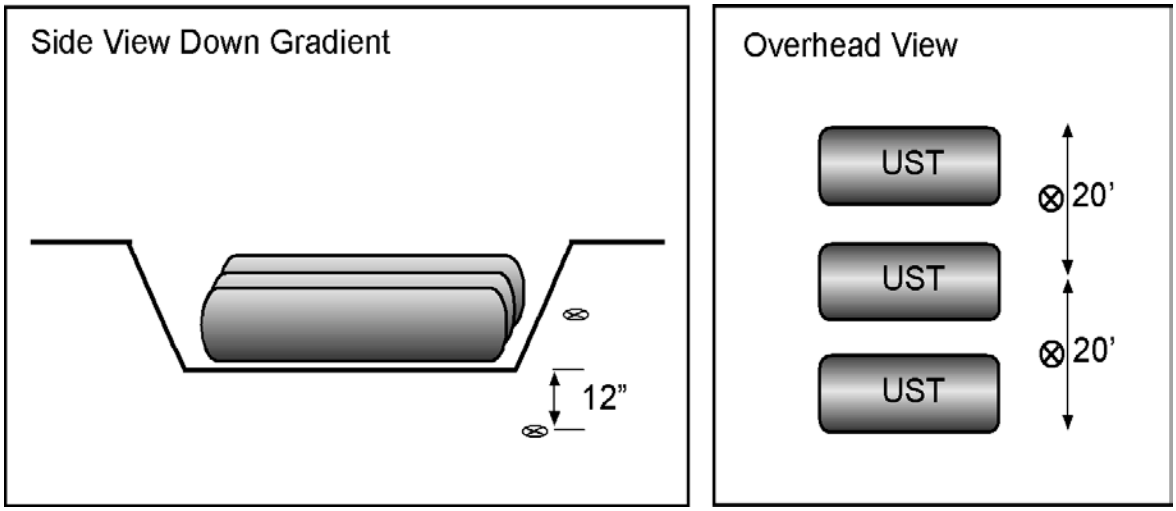


**Figure 4-1(d). Hydraulic Downgradient Wall Sampling, Greater than 20 Feet of Wall.**

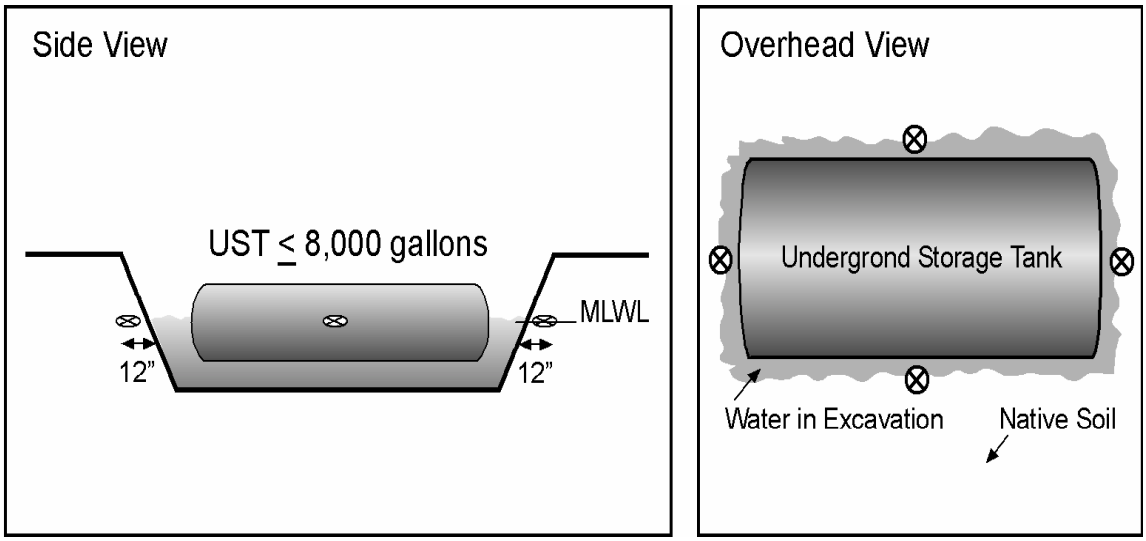


**Figure 4-2(a). Tank Excavation Sampling if Groundwater is Encountered for Single Tanks 8,000 Gallons or Less.**

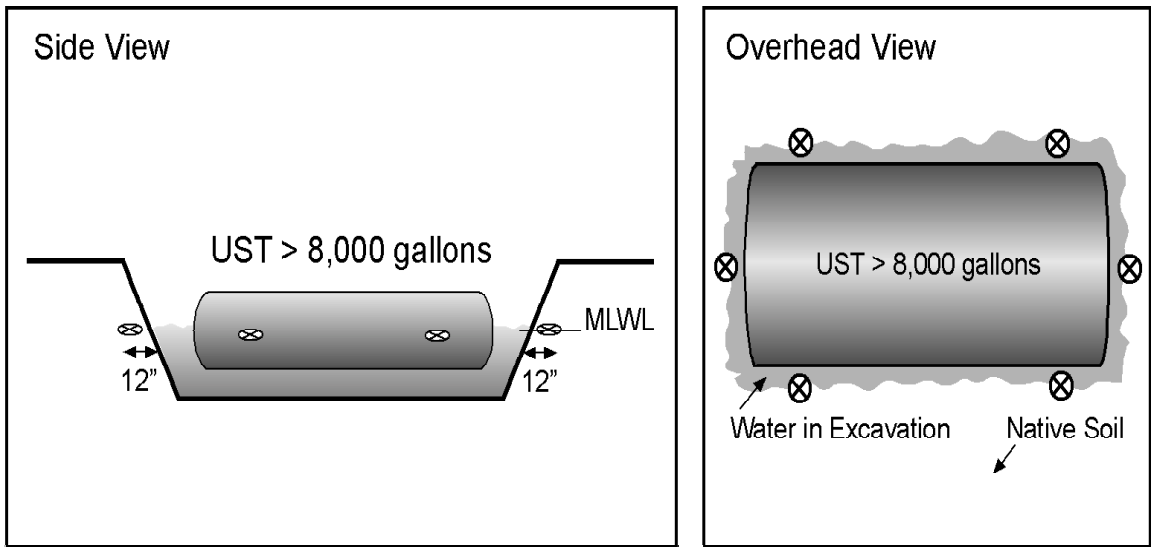


**Figure 4-2(b). Tank Excavation Sampling if Groundwater is Encountered for Single Tanks Greater Than 8,000 Gallons.**

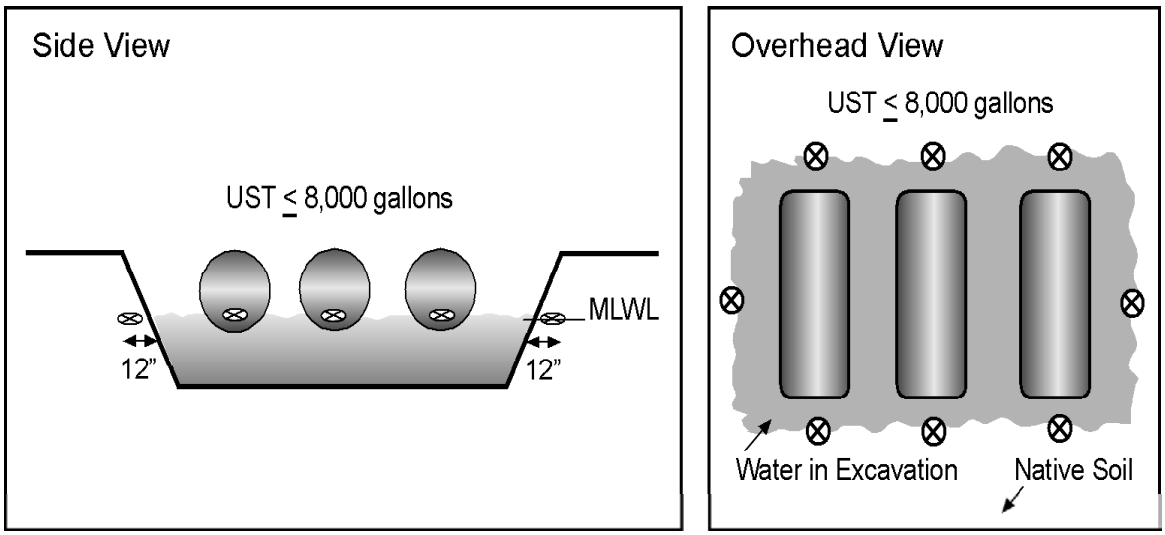


**Figure 4-2(c). Tank Excavation Sampling if Groundwater is Encountered for Multiple Tanks 8,000 Gallons or Less.**

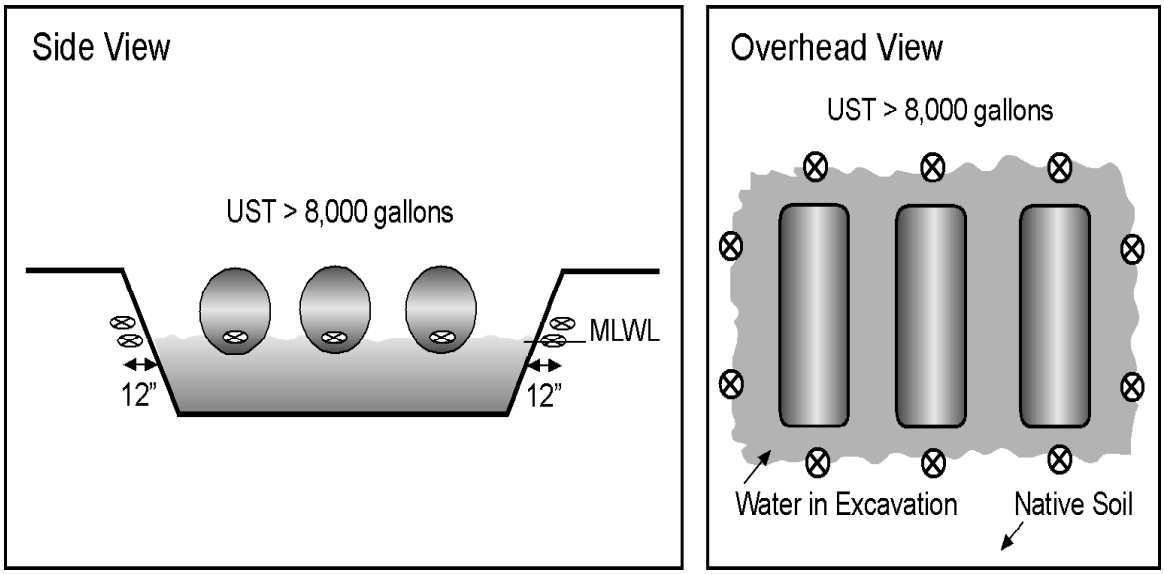


**Figure 4-2(d). Tank Excavation Sampling if Groundwater is Encountered for Multiple Tanks Greater Than 8,000 Gallons.**

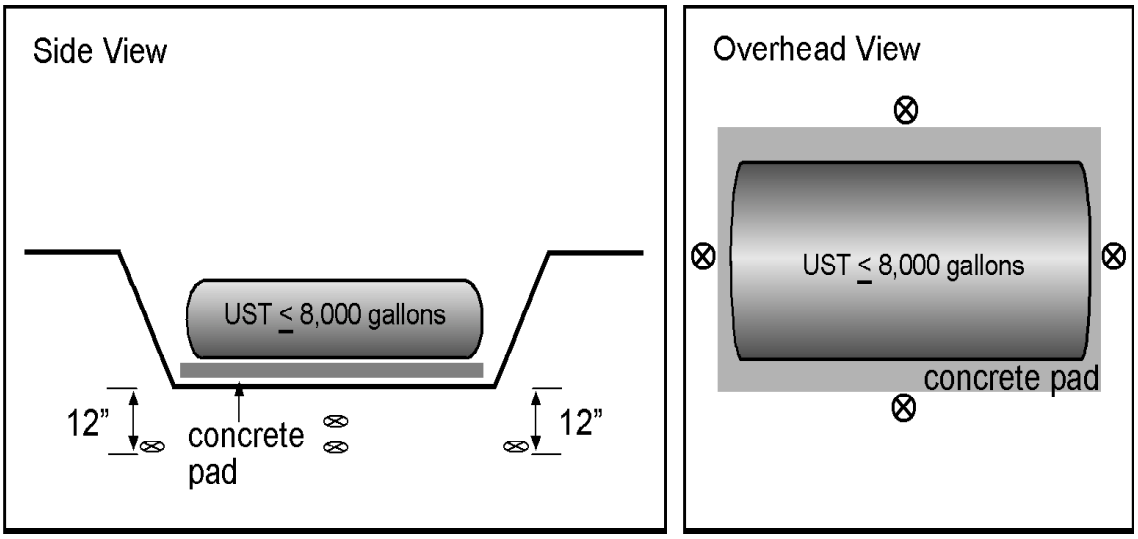


**Figure 4-3(a). Tank Excavation Sampling for Single Tanks 8,000 Gallons or Less Resting on a Concrete Pad.**

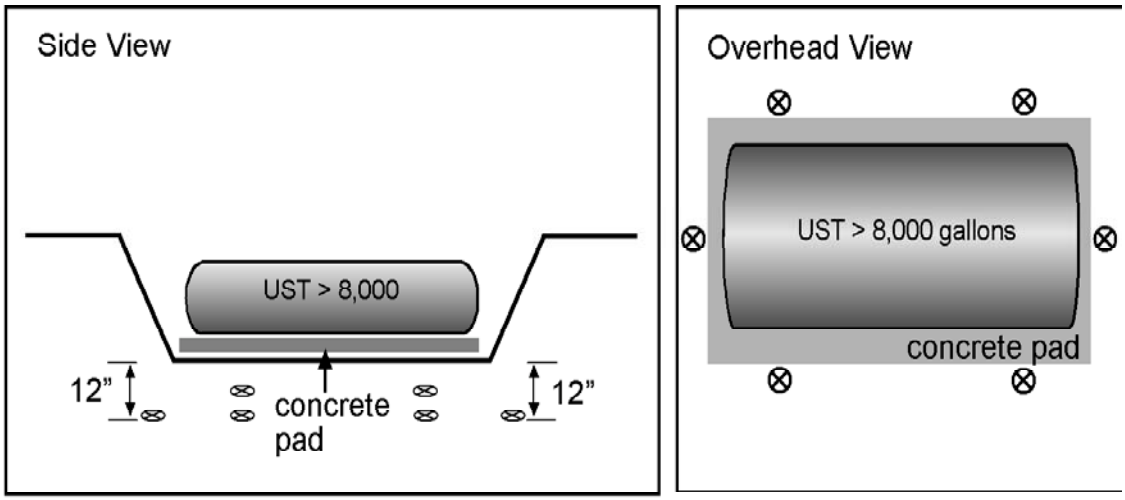


**Figure 4-3(b). Tank Excavation Sampling for a Single Tank Greater Than 8,000 Gallons Resting on a Concrete Pad.**

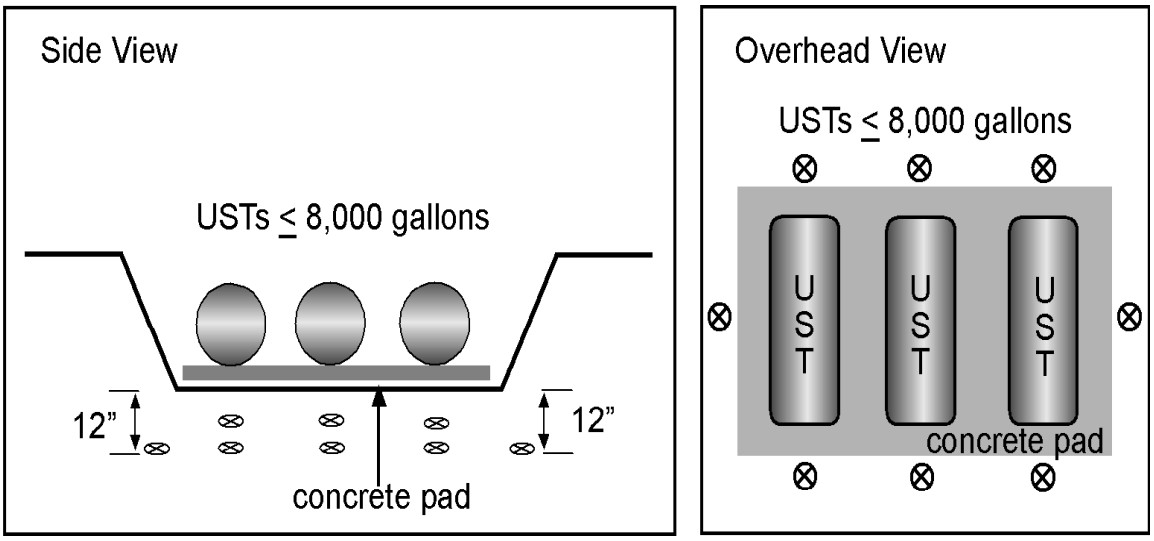


**Figure 4-3(c). Tank Excavation Sampling for Multiple Tanks 8,000 Gallons or Less Resting on a Concrete Pad.**

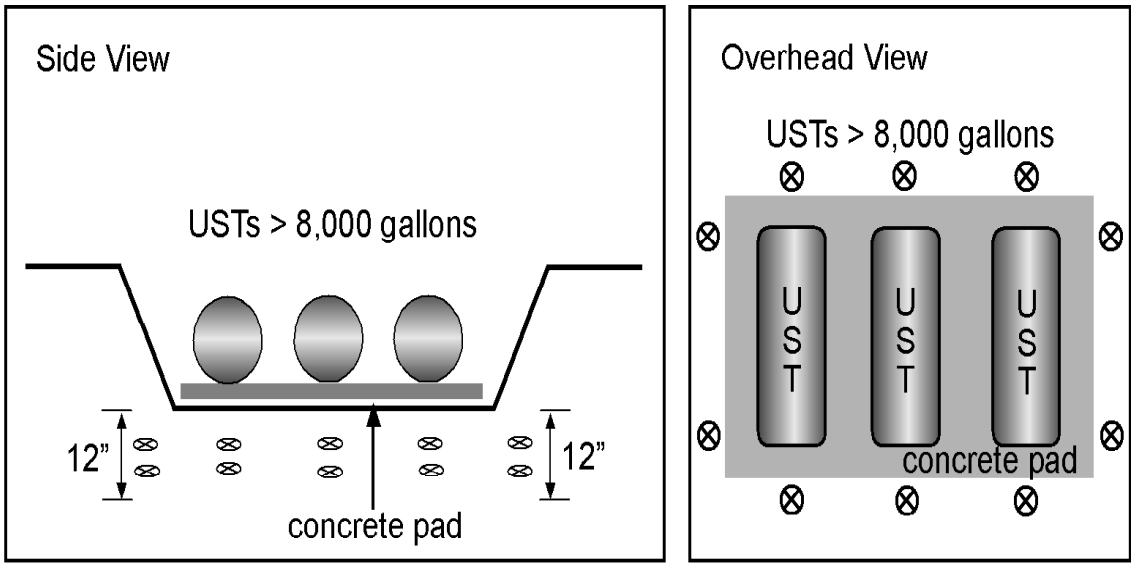


**Figure 4-3(d). Tank Excavation Sampling for Multiple Tanks Greater Than 8,000 Gallons Resting on a Concrete Pad.**

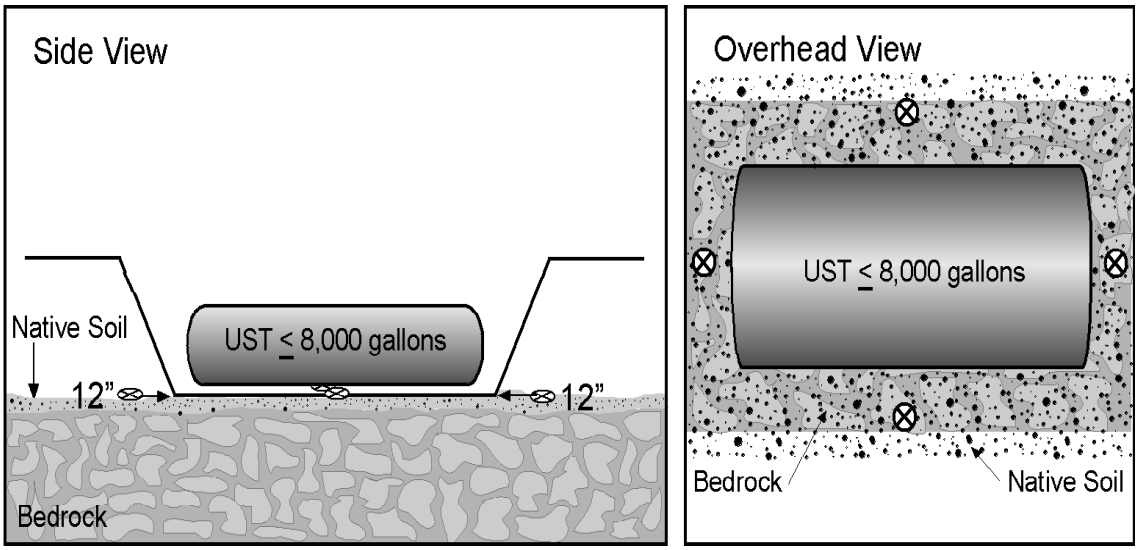


**Figure 4-4(a). Sampling for a Single Tank 8,000 Gallons or Less Resting on Bedrock.**

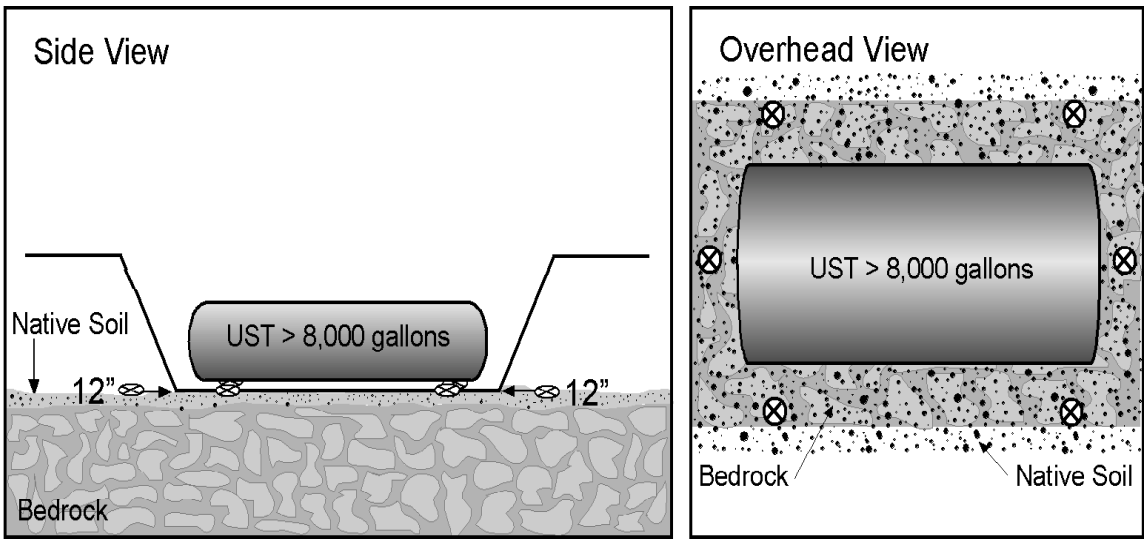


**Figure 4-4(b). Sampling for a Single Tank Greater Than 8,000Gallons Resting on Bedrock.**

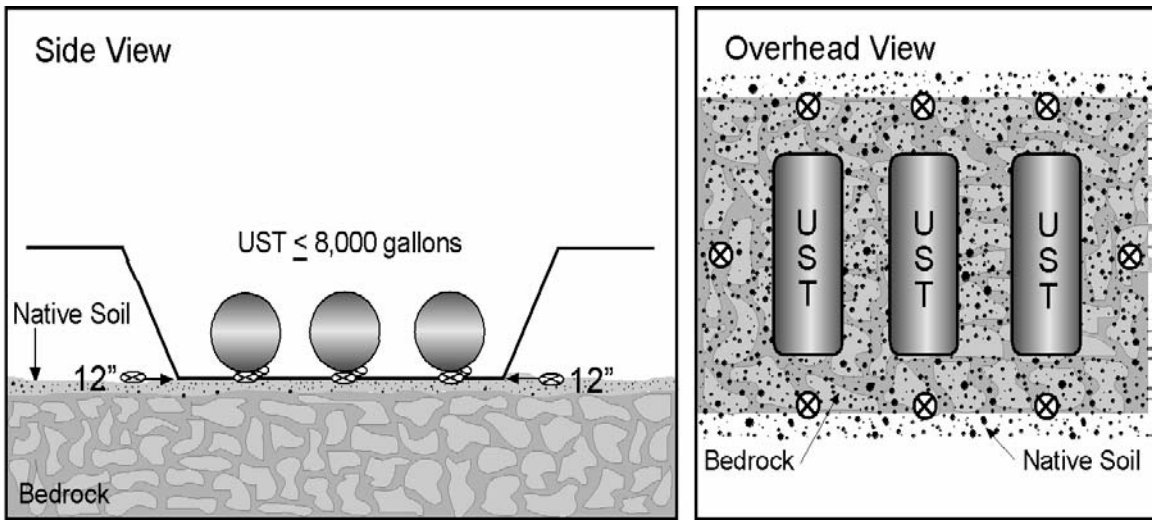


**Figure 4-4(c). Sampling for Multiple Tanks 8,000 Gallons or Less Resting on Bedrock.**

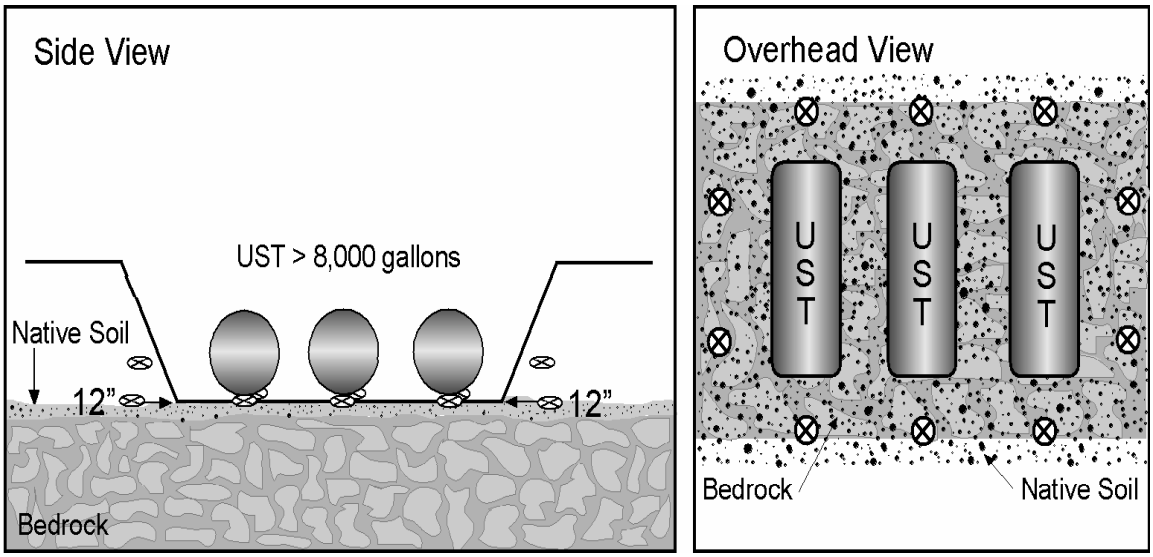


**Figure 4-4(d). Sampling for Multiple Tanks Greater Than 8,000 Gallons Resting on Bedrock.**

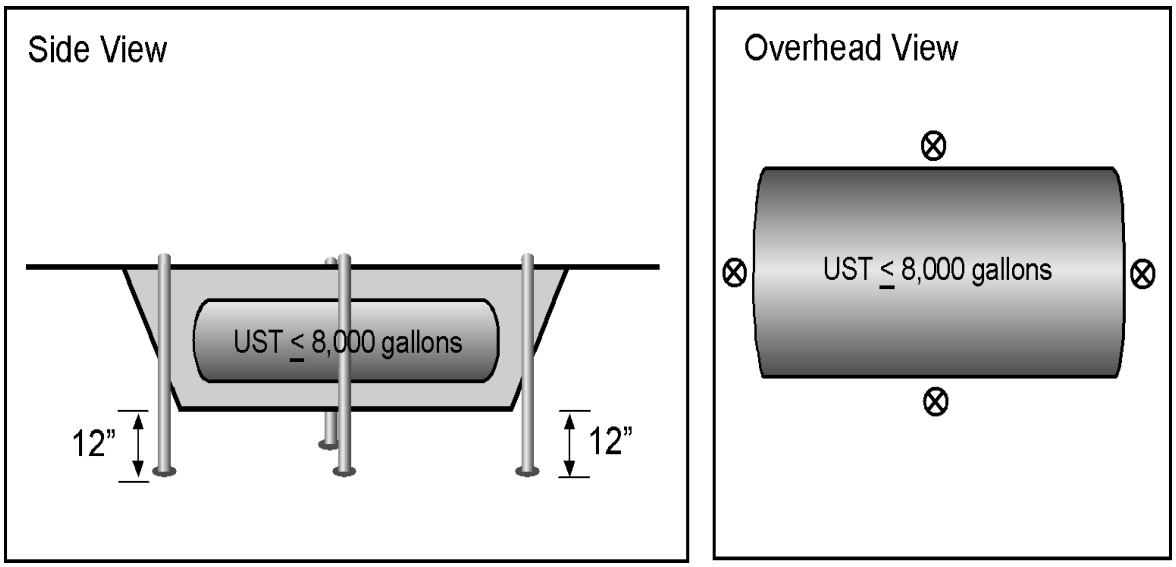


**Figure 4-5(a). In-Place Closure of a Single Tank 8,000 Gallons or Less.**

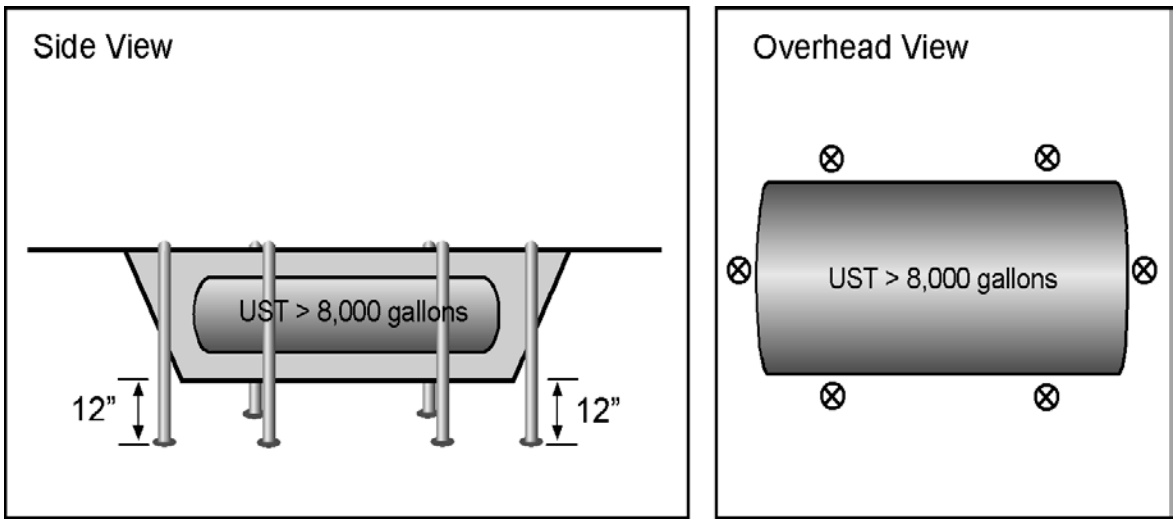


**Figure 4-5(b). In-Place Closure of a Single Tank Greater Than 8,000 Gallons.**

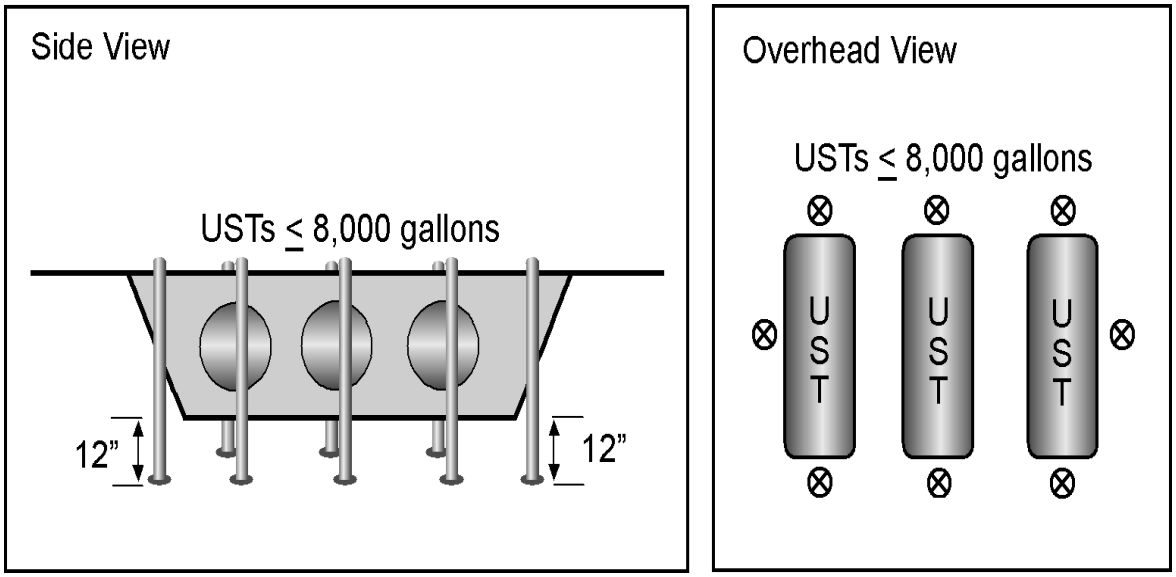


**Figure 4-5(c). In-Place Closure of Multiple Tanks 8,000 Gallons or Less.**

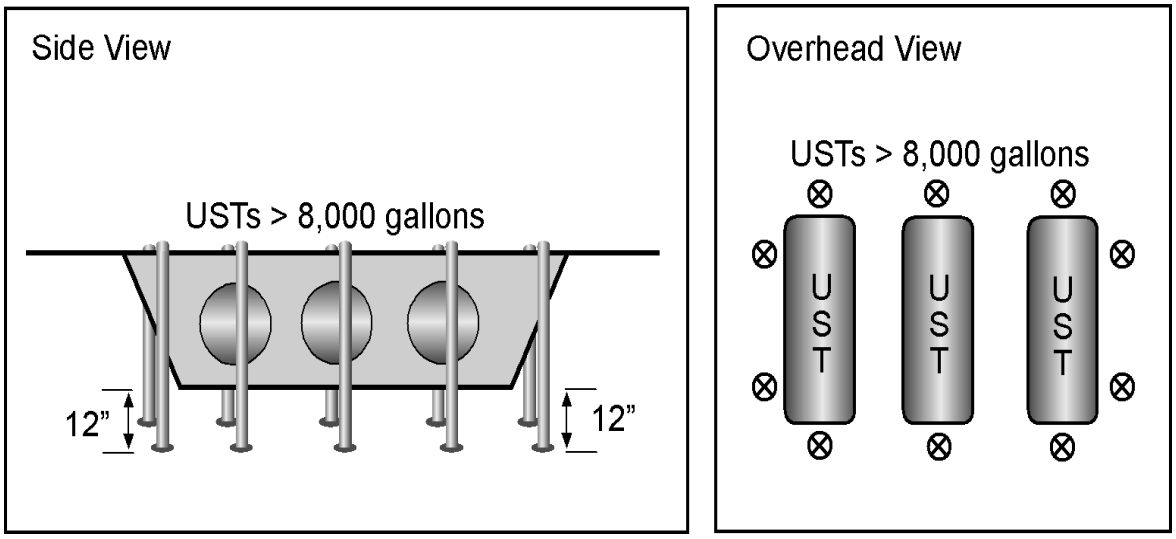


**Figure 4-5(d). In-Place Closure of Multiple Tanks Greater Than 8,000 Gallons.**

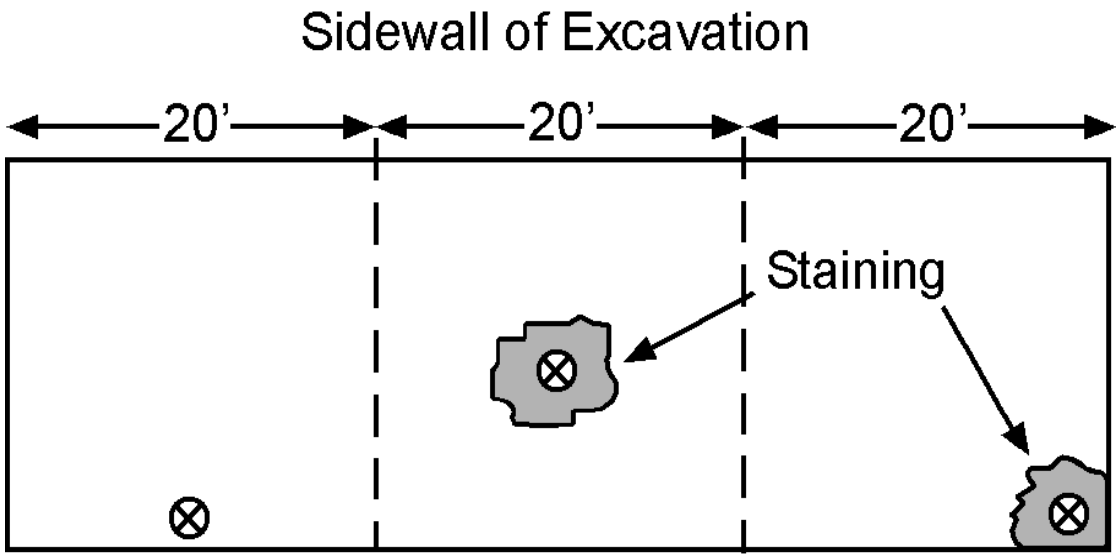


**Figure 4-6(a). Wall Sampling After Excavation of Contamination.**

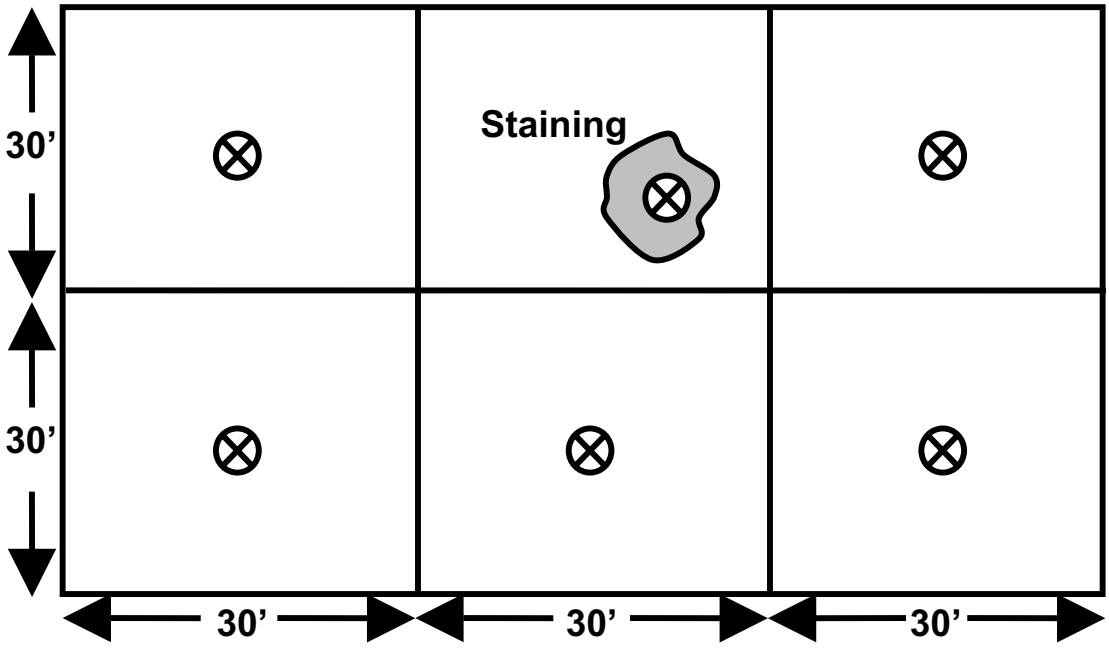


**Figure 4-6(b). Floor Sampling After Excavation of Contamination.**

**Table 4-1**
**Soil Concentration Levels to Determine the Need for Groundwater Evaluation During Tank Closure**

| Chemicals | Domestic Consumption of Groundwater Pathway | | | |
|---|---|---|---|---|
| | Complete | | Incomplete | |
| Benzene | 6.16E-02 | | 2.18E+00 | |
| Toluene | 3.09E+01 | # | 3.78E+02 | # |
| Ethylbenzene | 4.06E+01 | # | 1.77E+03 | # |
| Xylenes (mixed) | 6.45E+02 | # | 1.55E+03 | # |
| Ethylene Dibromide (EDB) | 5.31E-04 | | 1.25E+00 | |
| Ethylene Dichloride (EDC) | 1.30E-02 | | 1.27E+00 | |
| Methyl-tert-butyl-ether(MTBE) | 6.21E-01 | | 4.14E+02 | |
| Acenaphthene | 7.70E+01 | | 3.19E+05 | |
| Anthracene | 1.60E+03 | # | 2.00E+06 | # |
| Benzo(a)anthracene | 5.46E+01 | # | 1.33E+06 | # |
| Benzo(a)pyrene | 3.04E+01 | # | 4.57E+05 | # |
| Benzo(b)fluoranthene | 1.69E+02 | # | 3.26E+05 | # |
| Benzo(k)fluoranthene | 1.69E+03 | # | 2.32E+08 | # |
| Chrysene | 5.46E+03 | # | 1.12E+07 | # |
| Dibenzo(a,h)anthracene | 5.21E+01 | | 1.63E+07 | |
| Fluoranthene | 9.97E+03 | # | 4.04E+07 | # |
| Fluorene | 9.99E+01 | # | 1.14E+06 | # |
| Napthalene | 3.93E-01 | # | 3.28E+02 | # |
| Pyrene | 7.34E+03 | # | 4.68E+07 | # |
| TPH-GRO | 2.36E+03 | | 4.34E+03 | |
| TPH-DRO | 2.94E+09 | # | 2.47E+09 | # |
| TPH-ORO | 2.94E+09 | # | NA | |
| >C6 - C8 (Aliphatics) | 1.80E+03 | | 8.09E+02 | |
| >C8 - C10 (Aliphatics) | 5.46E+02 | | 1.75E+02 | |
| >C10 - C12 (Aliphatics) | 4.07E+03 | | 8.68E+02 | |
| >C12 - C16 (Aliphatics) | 1.17E+06 | # | 3.95E+04 | |
| >C16 - C35 (Aliphatics) | 2.94E+09 | # | NA | |
| >C8 - C10 (Aromatics) | 1.53E+01 | | 7.86E+02 | |
| >C10 - C12 (Aromatics) | 2.40E+01 | | 3.42E+03 | |
| >C12 - C16 (Aromatics) | 4.76E+01 | | 1.45E+04 | |
| >C16 - C21 (Aromatics) | 4.08E+02 | | NA | |
| >C21 - C35 (Aromatics) | 8.79E+03 | | NA | |
| Tertiary-amyl-methyl-ether (TAME) | 2.14E+00 | | NA | |
| Tertiary-butyl- alcohol (TBA) | 3.26E-01 | | 1.39E+03 | |
| Ethyl-tert-butyl-ether ( ETBE) | 4.68E-02 | | 2.12E+02 | |
| Diisopropyl ether ( DIPE) | 5.63E-03 | | 7.50E-01 | |
| Ethanol | 1.54E+00 | | 5.68E+04 | |
| Methanol | 4.18E-01 | | 1.24E+04 | |
| Arsenic | NA | | NA | |
| Barium | NA | | NA | |
| Cadmium | NA | | NA | |
| Chromium | NA | | NA | |
| Lead | NA | | NA | |
| Selenium | NA | | NA | |

Notes:
All concentrations are in mg/kg.
NA: Not Available
#: Concentrations greater then effective soil saturation concentration.